

## **Appendix H**

### **Field Screening and In Situ Gamma-Ray Data**



**ARA-01**  
**Field Screening Data**

Note: Selenium and thallium averages were calculated using one-half the reported less-than values.

Location	As (mg/kg)	Se (mg/kg)	Tl (mg/kg)
ARA-01-1	7.3	0.7	< 1.8
ARA-01-2	8.5	< 0.8	1.4
ARA-01-3-C	7.9	< 0.8	< 1.8
ARA-01-4	6.9	< 0.9	1.5
ARA-01-5	7.3	< 0.8	< 1.7
ARA-01-6	5.8	< 0.8	< 1.7
ARA-01-7	6.4	< 0.8	< 1.7
ARA-01-8	7.3	0.9	< 1.8
ARA-01-9-C	7.1	< 1.0	< 1.9
ARA-01-10-C	9.1	1.2	< 1.9
ARA-01-11	6.7	< 0.9	< 1.9
ARA-01-12	7.1	0.8	< 1.9
ARA-01-13	7.3	< 0.9	< 1.9
ARA-01-14	6.3	0.7	< 1.7
ARA-01-15	5.6	< 0.9	< 1.9
ARA-01-16	8.2	0.5	< 1.9
ARA-01-17-C	7.6	0.7	< 2.1
ARA-01-18	4.8	1.0	< 2.0
ARA-01-19	5.4	1.4	1.5
ARA-01-20-C	6.9	< 0.9	2.4
ARA-01-21-C	5.7	< 0.9	< 1.7
ARA-01-22-C	7.0	1.2	1.5
ARA-01-23-C	6.9	0.8	< 1.9
ARA-01-24	6.7	0.5	< 1.9
ARA-01-25-C	6.8	2.0	< 1.9
ARA-01-26	9.5	0.4	1.9
ARA-01-27	6.8	1.0	< 1.7
ARA-01-28-C	6.5	< 0.8	< 1.7
ARA-01-29	7.9	< 0.9	1.3
ARA-01-30	7.7	0.9	2.1
<b>Average</b>	7.0	0.7	1.1
<b>Standard Deviation</b>	1.0	0.4	0.4
<b>Variance</b>	1.1	0.1	0.2
<b>Number of Samples Collected</b>	30	30	30
<b>Critical Value for False Positive</b>	0.05	0.05	0.05
<b>Critical Value for False Negative</b>	0.8	0.8	0.8
<b>Final Remediation Goal</b>	220	2.2	4.3
<b>LBGR (80% of FRG)</b>	176	1.76	3.44
<b>Number of Conf. Samples</b>	2	6	3

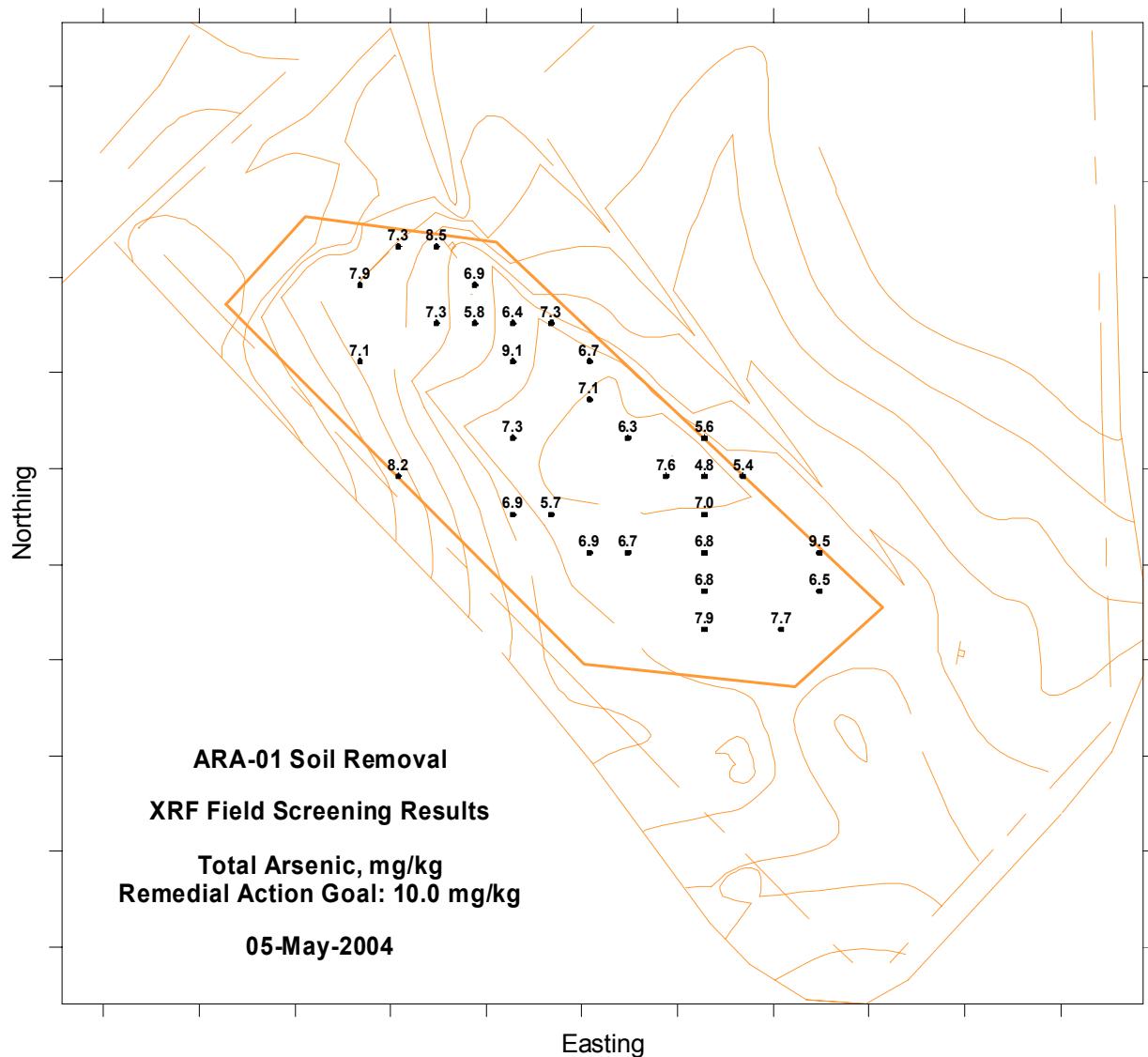


Figure H-1. ARA-01 arsenic XRF field screening results.

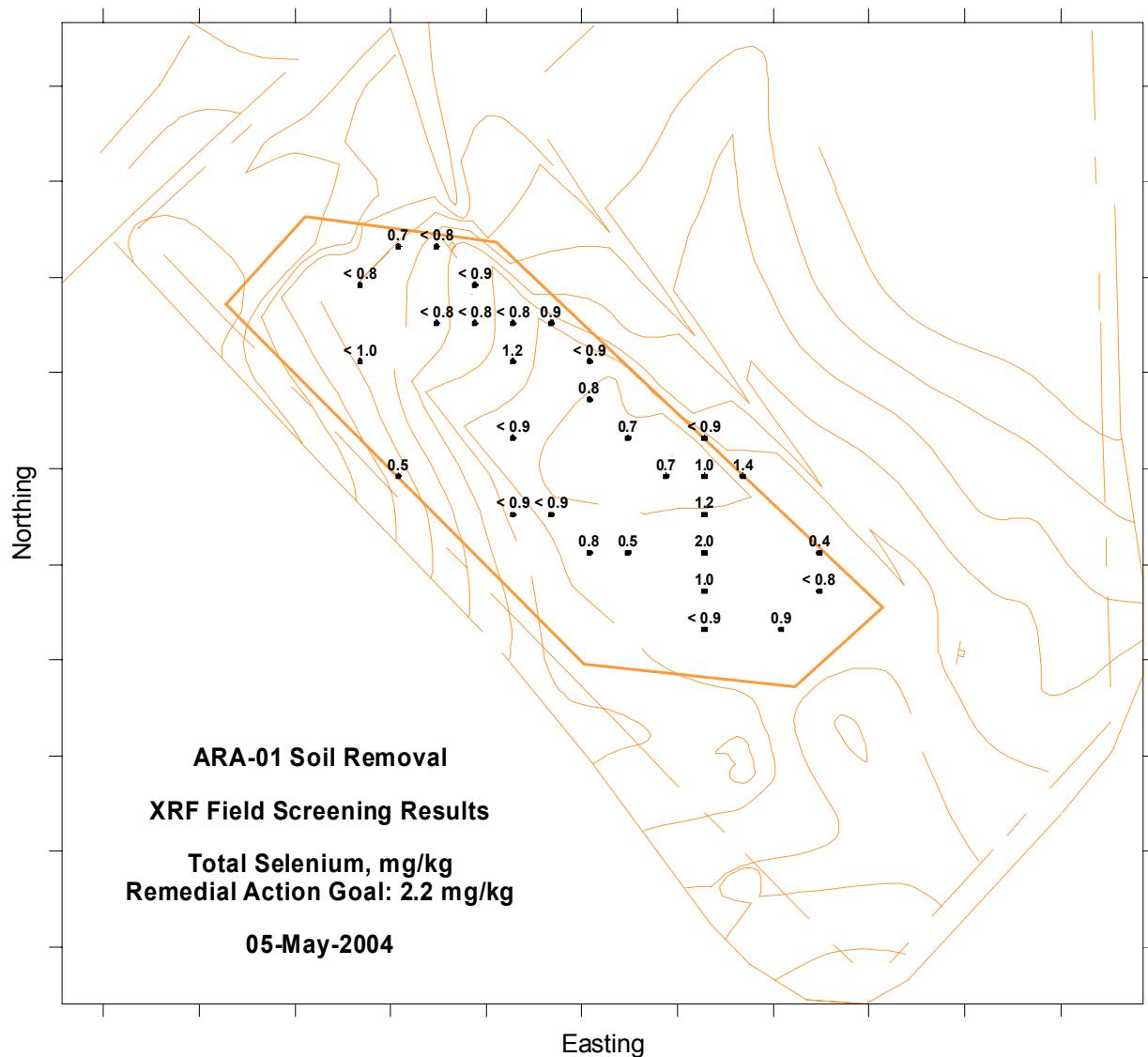


Figure H-2. ARA-01 selenium XRF field screening results.

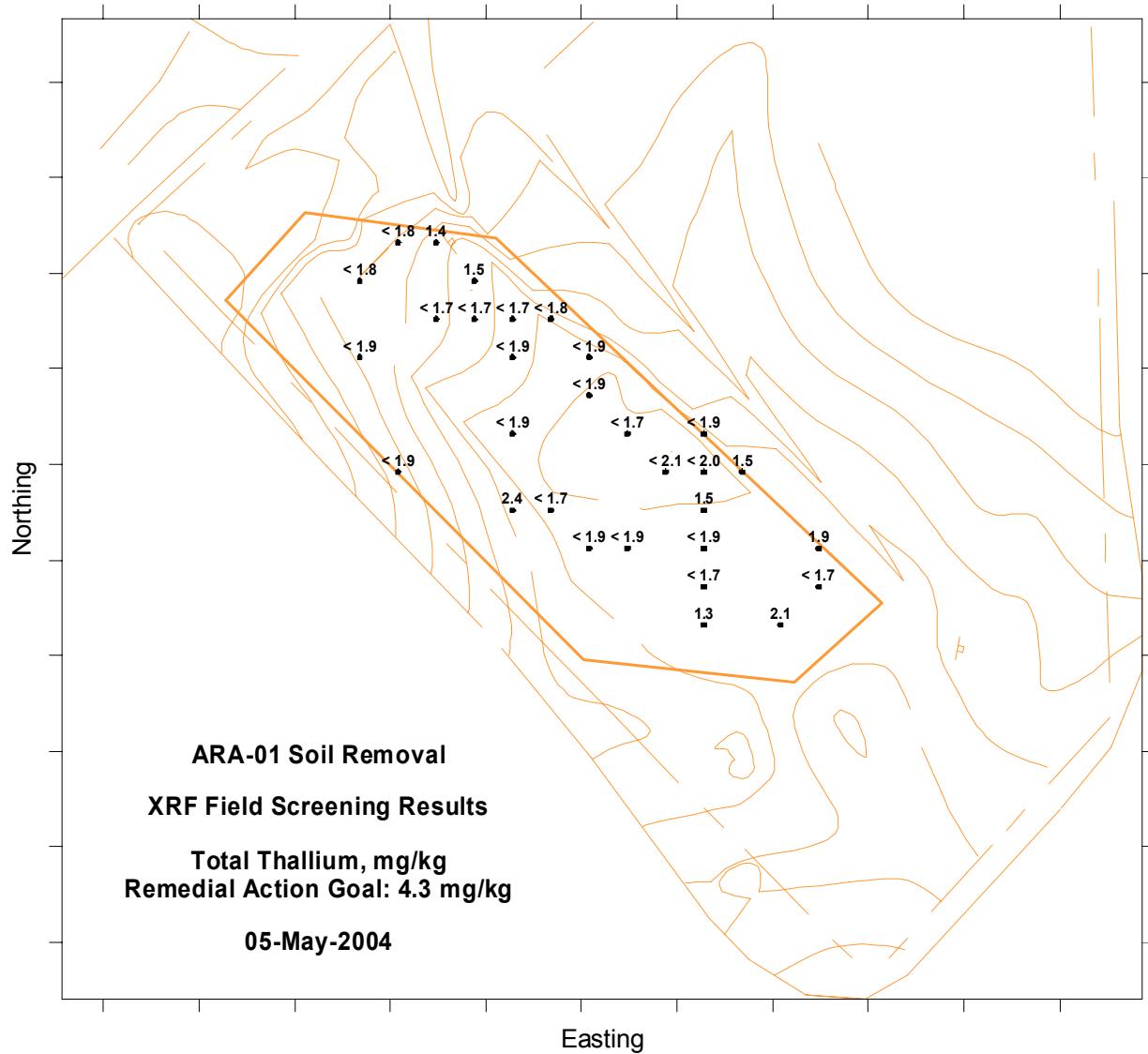


Figure H-3. ARA-01 thallium XRF field screening results.

**ARA-12**  
**Field Screening Data**

Note: Selenium average was calculated using one-half the reported less-than values.

Location	Cu (mg/kg)	Hg (mg/kg)	Se (mg/kg)	Ag-108m (pCi/g)	+/-
	57.0	0.10	0.5	0.89	0.02
	46.2	0.02	< 0.8	0.26	0.015
	27.4	0.02	1.1	0.25	0.02
	20.3	0.10	0.6	0.007	0.001
	30.5	0.10	1.4	0.37	0.02
	30.5	0.20	< 0.8	0.18	0.015
	27.3	0.02	1.3	0.16	0.025
	47.9	0.02	< 1.0	0.34	0.015
	24.1	0.02	0.9	0.18	0.02
	26.6	0.02	< 0.8	0.34	0.02
	22.0	0.02	< 0.9	0.1	0.01
	25.1	0.02	< 1.0	0.08	0.025
	30.6	0.02	< 0.8	0.18	0.02
	37.2	0.02	0.9	0.9	0.025
	34.2	0.02	< 0.8	0.44	0.015
	27.1	0.02	1.0	0.25	0.01
	33.7	0.02	0.5	0.14	0.04
	25.8	0.02	1.4	0.17	0.01
	69.4	0.10	< 0.8	0.35	0.035
	26.4	0.02	1.1	0.14	0.01
	27.6	0.02	0.8	0.25	0.01
	24.9	0.02	0.7	0.12	0.015
	25.0	0.02	1.3	0.47	0.02
	27.0	0.02	< 0.9	0.18	0.03
	19.2	0.02	0.8	0.34	0.02
	47.6	0.10	1.1	0.38	0.01
	31.3	0.02	0.9	0.56	0.03
	24.3	0.02	0.9	0.24	0.025
	50.7	0.02	1.4	1.28	0.025
	23.6	0.02	0.5	0.35	0.025
<b>Average</b>	32.4	0.039	0.8	0.3	0.0038
<b>Standard Deviation</b>	11.8	0.043	0.4	0.3	
<b>Variance</b>	140.0	0.002	0.1	0.1	
<b>Number of Samples Collected</b>	30	30	30	30	
<b>Critical Value for False Positive</b>	0.05	0.05	0.05	0.05	
<b>Critical Value for False Negative</b>	0.8	0.8	0.8	0.8	
<b>Final Remediation Goal</b>	220	0.5	2.2	0.75	
<b>LBGR (80% of FRG)</b>	176	0.04	1.76	0.6	
<b>Number of Conf. Samples</b>	2	2	6	22	

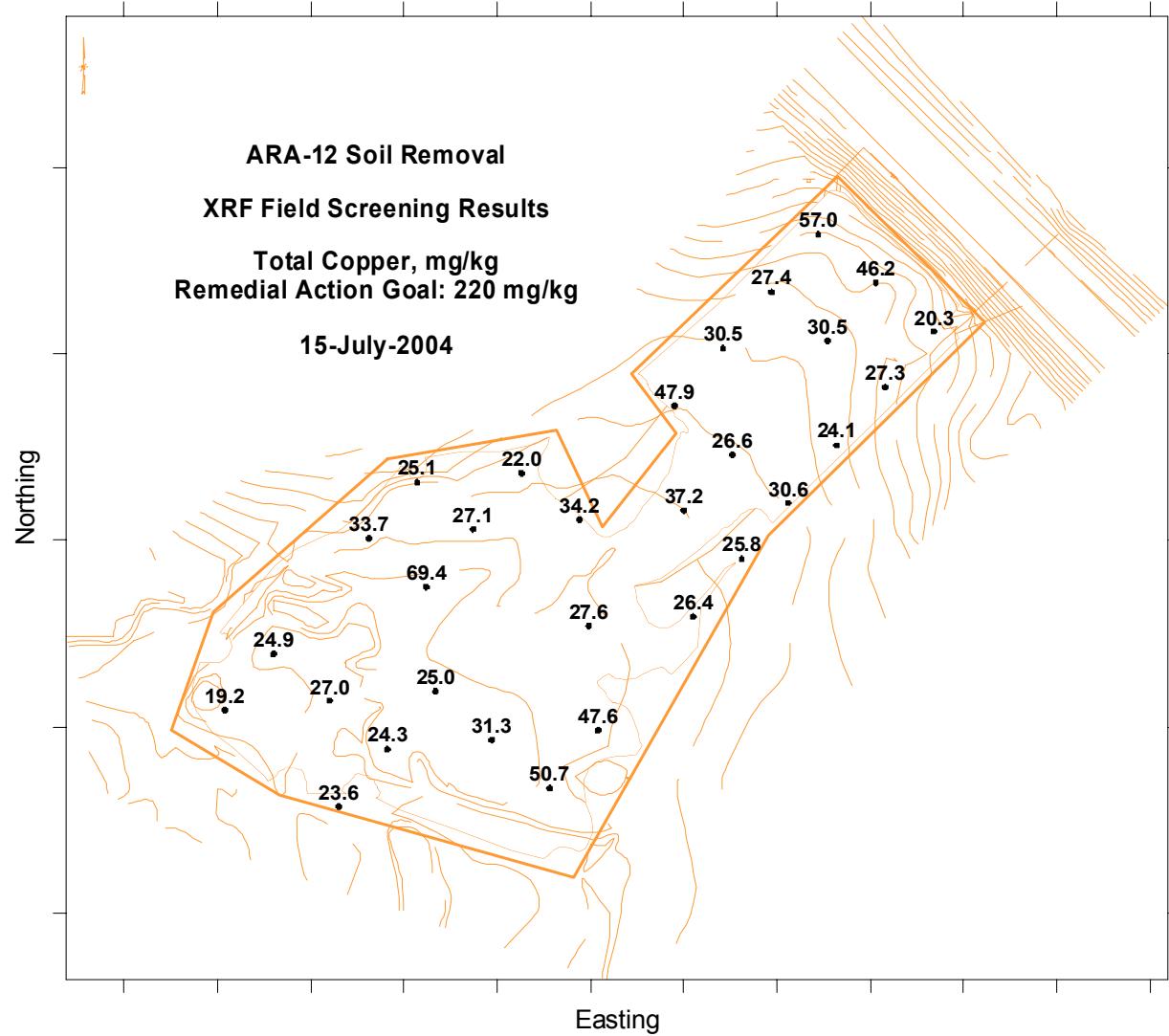


Figure H-4. ARA-12 copper XRF field screening results.

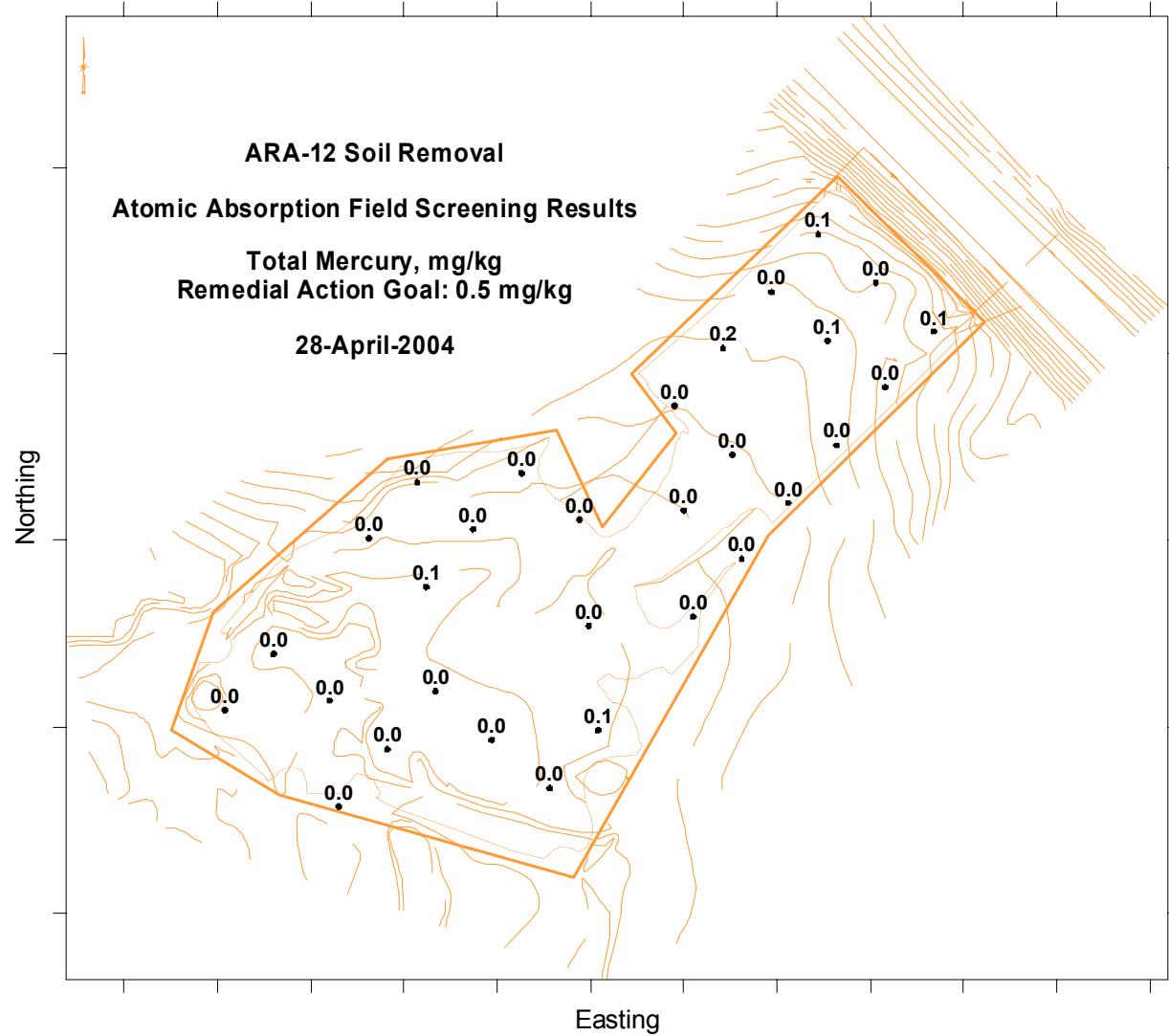


Figure H-5. ARA-12 mercury atomic absorption field screening results.

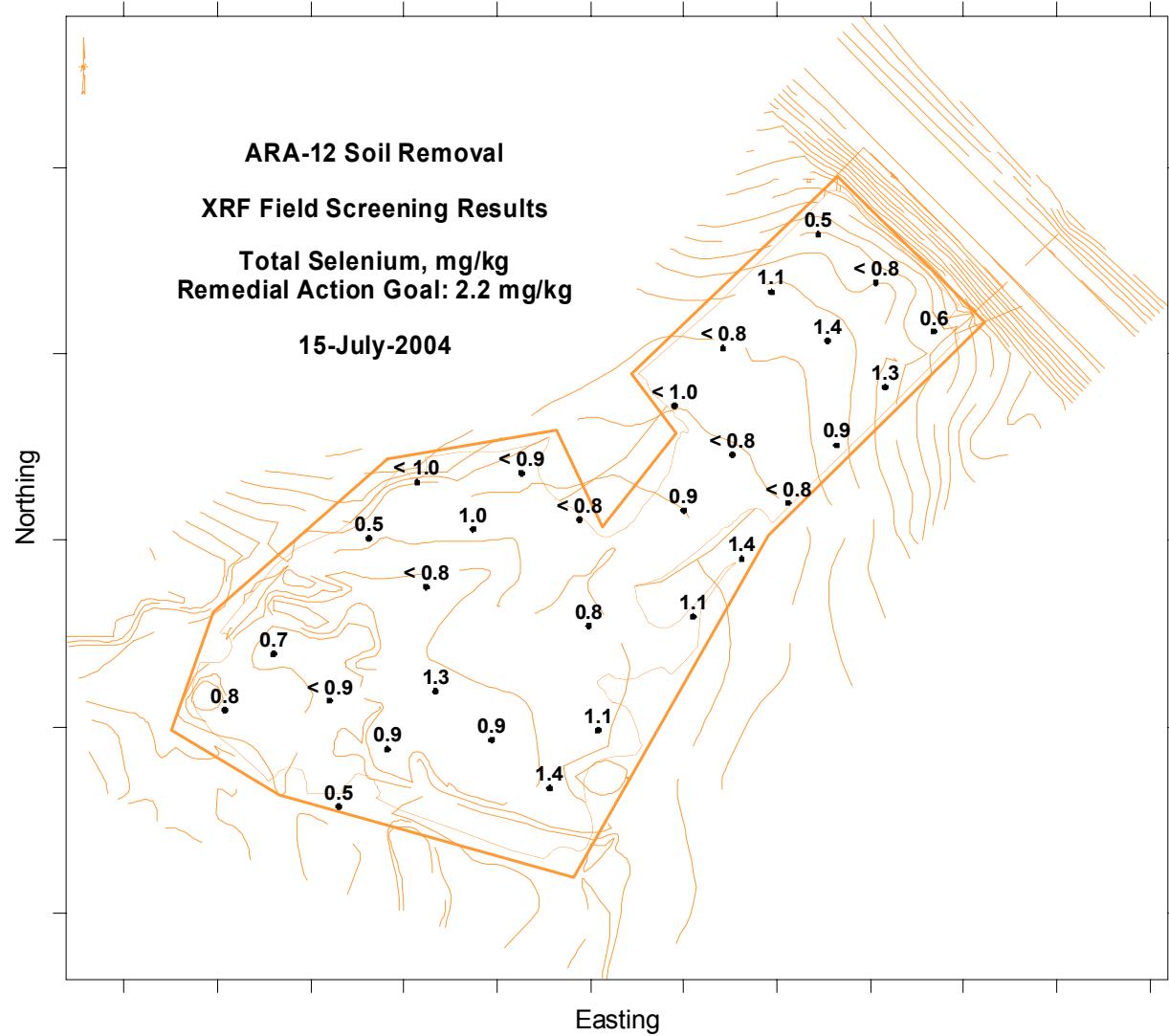


Figure H-6. ARA-12 selenium XRF field screening results.

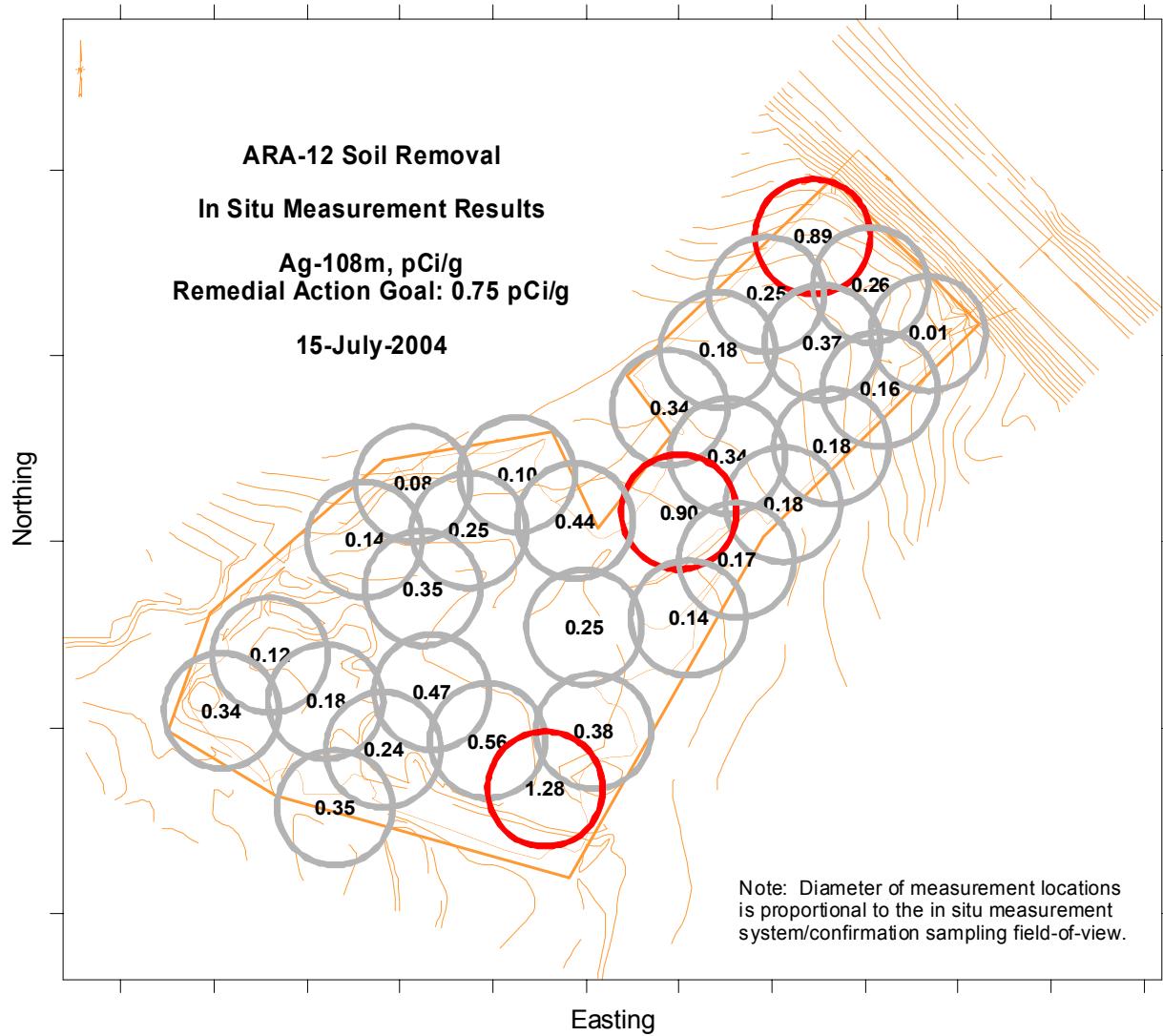
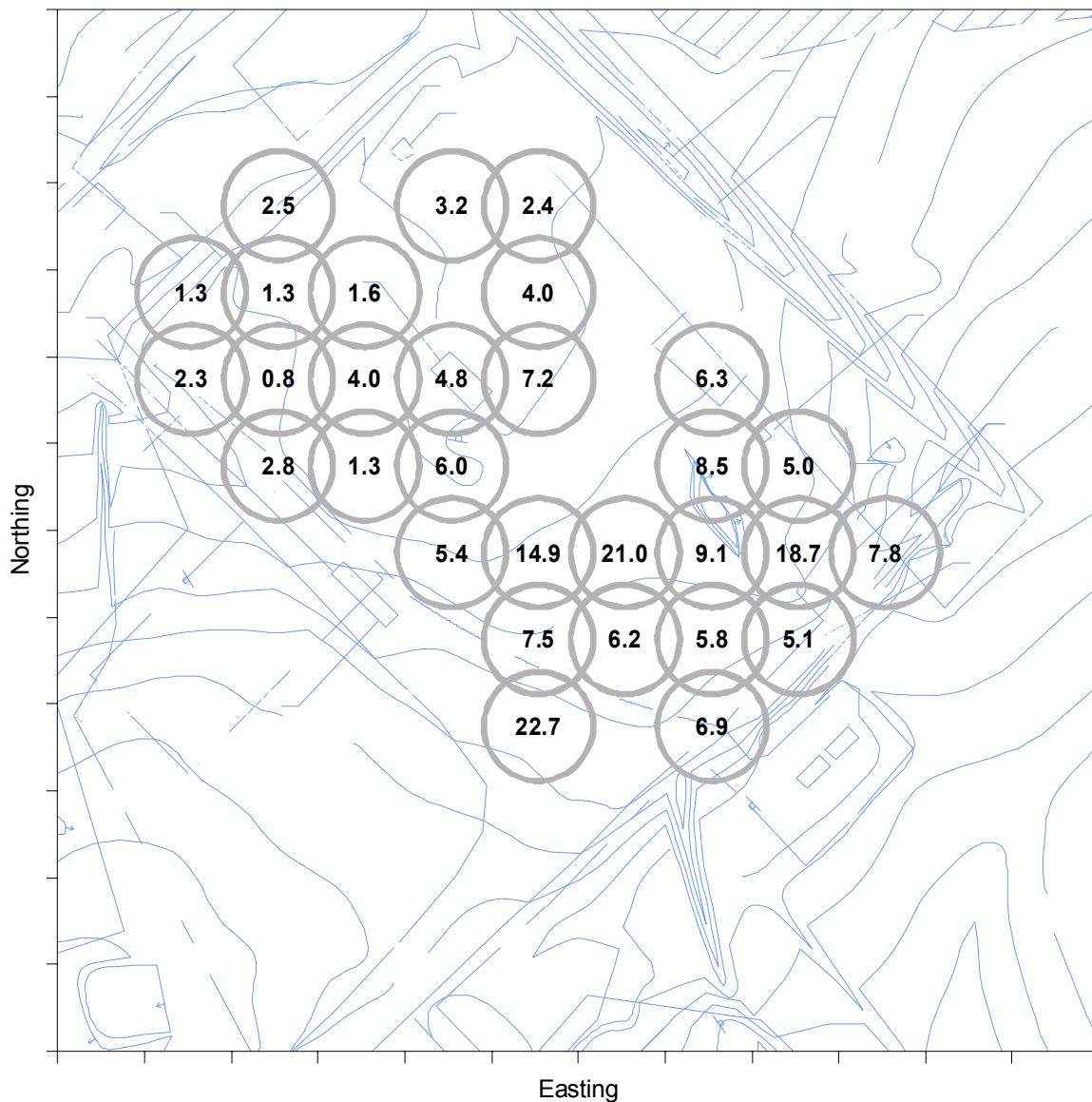


Figure H-7. ARA-12 Ag-108m in situ measurement results.

**ARA-23, ARA-I Facility Area  
In Situ Measurement Data**

Location	Cs-137 (pCi/g)	+/-
ARA-23-I-01-C	2.460	0.120
ARA-23-I-02	3.190	0.260
ARA-23-I-03	2.410	0.230
ARA-23-I-04	1.340	0.160
ARA-23-I-05	1.320	0.210
ARA-23-I-06-C	1.580	0.230
ARA-23-I-07-C	4.000	0.100
ARA-23-I-08	2.280	0.180
ARA-23-I-09	0.800	0.110
ARA-23-I-10	3.990	0.240
ARA-23-I-11	4.800	0.250
ARA-23-I-12	7.150	0.180
ARA-23-I-13	6.340	0.170
ARA-23-I-14	2.750	0.150
ARA-23-I-15	1.310	0.095
ARA-23-I-16-C	6.040	0.260
ARA-23-I-17	8.500	0.190
ARA-23-I-18	4.970	0.160
ARA-23-I-19-C	5.410	0.190
ARA-23-I-20	14.900	0.240
ARA-23-I-21-C	21.000	0.350
ARA-23-I-22-C	9.100	0.210
ARA-23-I-23	18.700	0.270
ARA-23-I-24	7.760	0.180
ARA-23-I-25-C	7.500	0.050
ARA-23-I-26	6.200	0.050
ARA-23-I-27	5.800	0.050
ARA-23-I-28	5.100	0.050
ARA-23-I-29-C	22.700	0.050
ARA-23-I-30-C	6.900	0.050

<b>Average</b>	6.543	0.034
<b>Standard Deviation</b>	5.695	
<b>Variance</b>	32.437	
<b>Number of Samples Collected</b>	30	
<b>Critical Value for False Positive</b>	0.05	
<b>Critical Value for False Negative</b>	0.8	
<b>Final Remediation Goal</b>	23	
<b>LBGR (80% of FRG)</b>	18.4	
<b>Number of Conf. Samples</b>	11	



**ARA-I Facility Excavation Area  
ARA-23 Soil Removal**

**In Situ Measurement Results**

**Cs-137 Concentrations, pCi/g  
Remedial Action Goal: 23.0 pCi/g**

**30-September-2004**



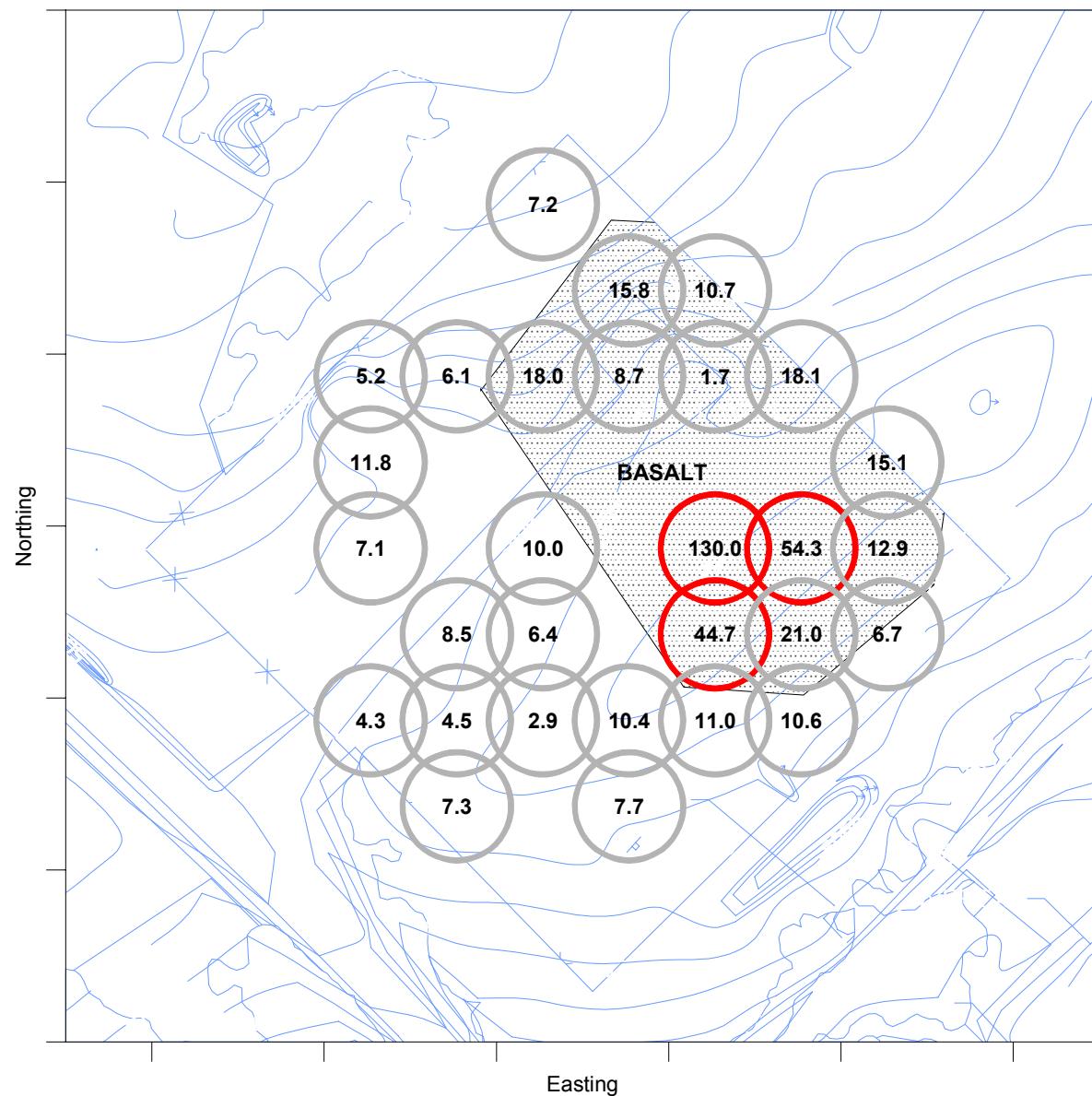
Note: Diameter of measurement locations is proportional to the in situ measurement system/confirmation sampling field-of-view.

Figure H-8. ARA-I facility area (ARA-23) Cs-137 in situ measurement results.

**ARA-23, ARA-II Facility Area  
In Situ Measurement Data**

Point ID	Cs-137 (pCi/g)	+/-
ARA-23-II-01	7.170	0.180
ARA-23-II-02-C	15.800	0.240
ARA-23-II-03-A	10.700	0.200
ARA-23-II-04-C	5.200	0.170
ARA-23-II-05-C	6.120	0.170
ARA-23-II-06-C	18.000	0.260
ARA-23-II-07	8.700	0.100
ARA-23-II-08-C	1.700	0.070
ARA-23-II-09	18.100	0.270
ARA-23-II-10	11.800	0.340
ARA-23-II-11	15.100	0.300
ARA-23-II-12	7.100	0.170
ARA-23-II-13-C	9.990	0.200
ARA-23-II-14-A	130.000	0.680
ARA-23-II-15-C	54.300	0.620
ARA-23-II-16	12.900	0.300
ARA-23-II-17-C	8.480	0.190
ARA-23-II-18	6.370	0.210
ARA-23-II-19-A		
ARA-23-II-20-C	44.700	0.370
ARA-23-II-21	21.000	0.350
ARA-23-II-22	6.700	0.230
ARA-23-II-23	4.330	0.140
ARA-23-II-24	4.460	0.180
ARA-23-II-25-C	2.910	0.170
ARA-23-II-26	10.400	0.300
ARA-23-II-27	11.000	0.280
ARA-23-II-28	10.600	0.240
ARA-23-II-29	7.260	0.220
ARA-23-II-30-C	7.700	0.280

<b>Average</b>	16.503	0.051
<b>Standard Deviation</b>	24.59780523	
<b>Variance</b>	605.0520222	
<b>Number of Samples Collected</b>	29	
<b>Critical Value for False Positive</b>	0.05	
<b>Critical Value for False Negative</b>	0.8	
<b>Final Remediation Goal</b>	23	
<b>LBGR (80% of FRG)</b>	18.4	
<b>Number of Conf. Samples</b>	179	



**ARA-II Facility Excavation Area  
ARA-23 Soil Removal**

**In Situ Measurement Results**

**Cs-137 Concentrations, pCi/g  
Remedial Action Goal: 23.0 pCi/g**

**30-September-2004**



Note: Diameter of measurement locations is proportional to the in-situ measurement system/confirmation sampling field-of-view.

Figure H-9. ARA-II facility area (ARA-23) Cs-137 in situ measurement results.

**ARA-23, Equipment Washdown Area**  
**In Situ Measurement Data**

Point ID	Cs-137 (pCi/g)	+/-
ARA-23E-01	2.300	0.100
ARA-23E-02	5.270	0.140
ARA-23E-03-C	5.400	0.210
ARA-23E-04-C	3.880	0.390
ARA-23E-05	15.200	0.240
ARA-23E-06	0.853	0.067
ARA-23E-07	2.330	0.110
ARA-23E-08	13.200	0.200
ARA-23E-09	5.060	0.240
ARA-23E-10	7.000	0.210
ARA-23E-11	5.380	0.180
ARA-23E-12	3.780	0.160
ARA-23E-13-C	5.530	0.210
ARA-23E-14	14.800	0.280
ARA-23E-15-C	10.900	0.220
ARA-23E-16	12.500	0.300
ARA-23E-17	5.920	0.230
ARA-23E-18-C	2.100	0.100
ARA-23E-19-C	1.800	0.130
ARA-23E-20	3.510	0.130
ARA-23E-21	3.600	0.200
ARA-23E-22-C-A	9.400	0.100
ARA-23E-23	7.770	0.160
ARA-23E-24	5.820	0.140
ARA-23E-25	3.770	0.110
ARA-23E-26-C	12.700	0.200
ARA-23E-27	10.600	0.210
ARA-23E-28	5.590	0.130
ARA-23E-29-C	10.200	0.170
ARA-23E-30-C	8.600	0.100
ARA-23E-31-A	7.440	0.170
ARA-23E-32-A	20.800	0.200
ARA-23E-33-A	17.300	0.200

<b>Average</b>	7.585	0.037
<b>Standard Deviation</b>	4.89794097	
<b>Variance</b>	23.98982575	
<b>Number of Samples Collected</b>	33	
<b>Critical Value for False Positive</b>	0.05	
<b>Critical Value for False Negative</b>	0.8	
<b>Final Remediation Goal</b>	23	
<b>LBGR (80% of FRG)</b>	18.4	
<b>Number of Conf. Samples</b>	9	

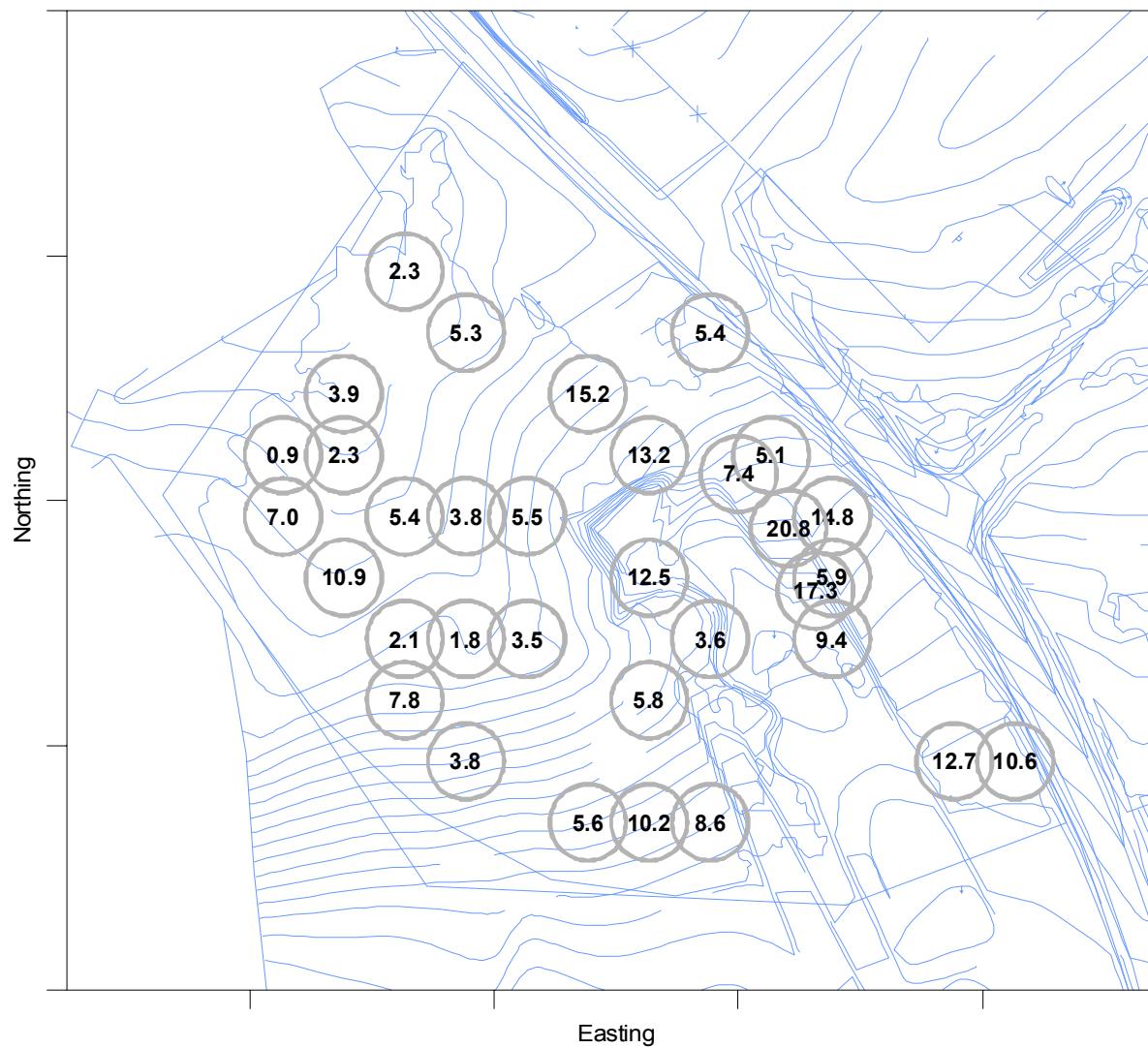


Figure H-10. Equipment washdown area (ARA-23) Cs-137 in situ measurement results.

Equipment Washdown Excavation Area  
ARA-23 Soil Removal

In Situ Measurement Results

Cs-137 Concentrations, pCi/g  
Remedial Action Goal: 23.0 pCi/g

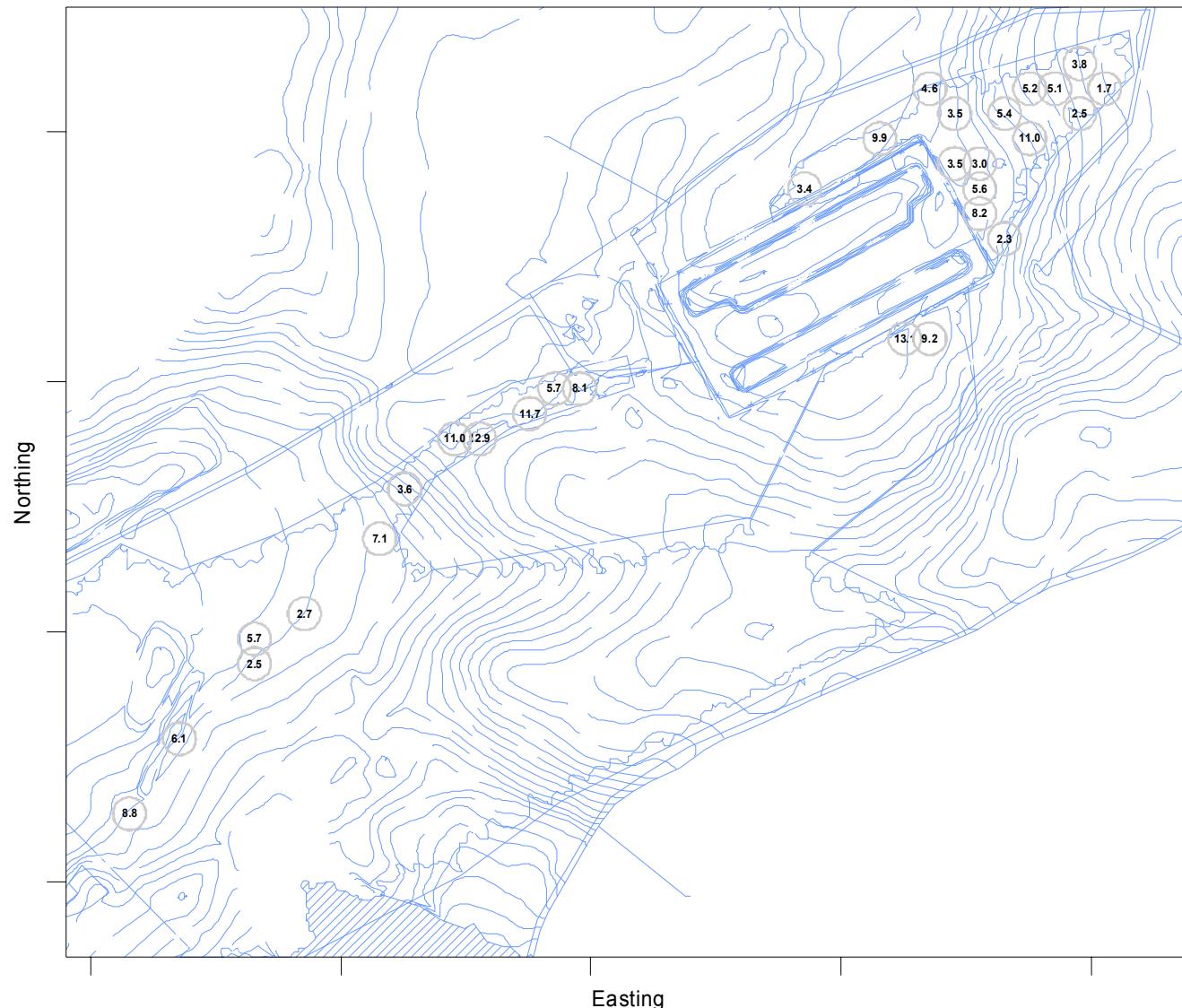
30-September-2004



Note: Diameter of measurement locations  
is proportional to the in situ measurement  
system/confirmation sampling field-of-view.

**ARA-23, Haul Road and Turnaround Area**  
**In Situ Measurement Data**

Point ID	Cs-137 (pCi/g)	+/-
ARA-23H-01-C	3.800	0.120
ARA-23H-02-C	4.630	0.120
ARA-23H-03	5.200	0.130
ARA-23H-04	5.100	0.120
ARA-23H-05	1.700	0.100
ARA-23H-06	3.520	0.180
ARA-23H-07	5.430	0.140
ARA-23H-08-C	2.500	0.120
ARA-23H-09	9.920	0.150
ARA-23H-10	11.000	0.180
ARA-23H-11-C	3.030	0.110
ARA-23H-12	3.350	0.120
ARA-23H-13-C	3.480	0.210
ARA-23H-14	5.570	0.190
ARA-23H-15	8.200	0.170
ARA-23H-16	2.300	0.100
ARA-23H-17	13.100	0.170
ARA-23H-18-C	9.200	0.160
ARA-23H-19-C	5.700	0.140
ARA-23H-20-C	8.100	0.160
ARA-23H-21-C	11.700	0.180
ARA-23H-22	12.900	0.300
ARA-23H-23	11.000	0.180
ARA-23H-24	3.580	0.100
ARA-23H-25	7.100	0.150
ARA-23H-26	2.700	0.110
ARA-23H-27-C	5.700	0.140
ARA-23H-28	2.500	0.110
ARA-23H-29	6.100	0.150
ARA-23H-30	8.790	0.160
<b>Average</b>	<b>6.230</b>	<b>0.028</b>
<b>Standard Deviation</b>	<b>3.39071145</b>	
<b>Variance</b>	<b>11.49692414</b>	
<b>Number of Samples Collected</b>	<b>30</b>	
<b>Critical Value for False Positive</b>	<b>0.05</b>	
<b>Critical Value for False Negative</b>	<b>0.8</b>	
<b>Final Remediation Goal</b>	<b>23</b>	
<b>LBGR (80% of FRG)</b>	<b>18.4</b>	
<b>Number of Conf. Samples</b>	<b>5</b>	



Haul Road/Turnaround Excavation Area  
ARA-23 Soil Removal

In Situ Measurement Results

Cs-137 Concentrations, pCi/g  
Remedial Action Goal: 23.0 pCi/g

30-September-2004



Note: Diameter of measurement locations is proportional to the in situ measurement system/confirmation sampling field-of-view.

Figure H-11. Haul road and turnaround area (ARA-23) Cs-137 in situ measurement results.

<b>ARA-23, Windblown Area In Situ Measurement Data</b>	<b>Point ID</b>	<b>Cs-137 (pCi/g)</b>	<b>+/-</b>
	ARA-23W-01	4.180	0.120
	ARA-23W-02	6.500	0.100
	<b>ARA-23W-03-C</b>	<b>12.040</b>	<b>0.110</b>
	ARA-23W-04	10.500	0.120
	ARA-23W-05	7.000	0.130
	<b>ARA-23W-06-C</b>	<b>6.000</b>	<b>0.140</b>
	ARA-23W-07	2.700	0.170
	ARA-23W-08	6.940	0.190
	ARA-23W-09	3.400	0.150
	<b>ARA-23W-10-C</b>	<b>8.500</b>	<b>0.150</b>
	ARA-23W-11-C	3.000	0.160
	<b>ARA-23W-12-C</b>	<b>6.000</b>	<b>0.170</b>
	ARA-23W-13	1.500	0.100
	<b>ARA-23W-14-C</b>	<b>5.000</b>	<b>0.180</b>
	ARA-23W-15	5.000	0.190
	ARA-23W-16	4.670	0.200
	ARA-23W-17	13.000	0.210
	ARA-23W-18	12.000	0.220
	<b>ARA-23W-19-C</b>	<b>6.390</b>	<b>0.180</b>
	ARA-23W-20	13.200	0.260
	<b>ARA-23W-21-C</b>	<b>2.000</b>	<b>0.260</b>
	ARA-23W-22	2.900	0.100
	ARA-23W-23	6.890	0.150
	<b>ARA-23W-24-C</b>	<b>14.900</b>	<b>0.240</b>
	ARA-23W-25-C	18.000	0.220
	ARA-23W-26	12.700	0.180
	ARA-23W-27	5.840	0.180
	ARA-23W-28	11.300	0.220
	ARA-23W-29	12.400	0.220
	ARA-23W-30	13.500	0.260
<b>Average</b>		<b>7.932</b>	<b>0.033</b>
<b>Standard Deviation</b>		4.409926955	
<b>Variance</b>		19.44745575	
<b>Number of Samples Collected</b>		30	
<b>Critical Value for False Positive</b>		0.05	
<b>Critical Value for False Negative</b>		0.8	
<b>Final Remediation Goal</b>		23	
<b>LBGR (80% of FRG)</b>		18.4	
<b>Number of Conf. Samples</b>		8	

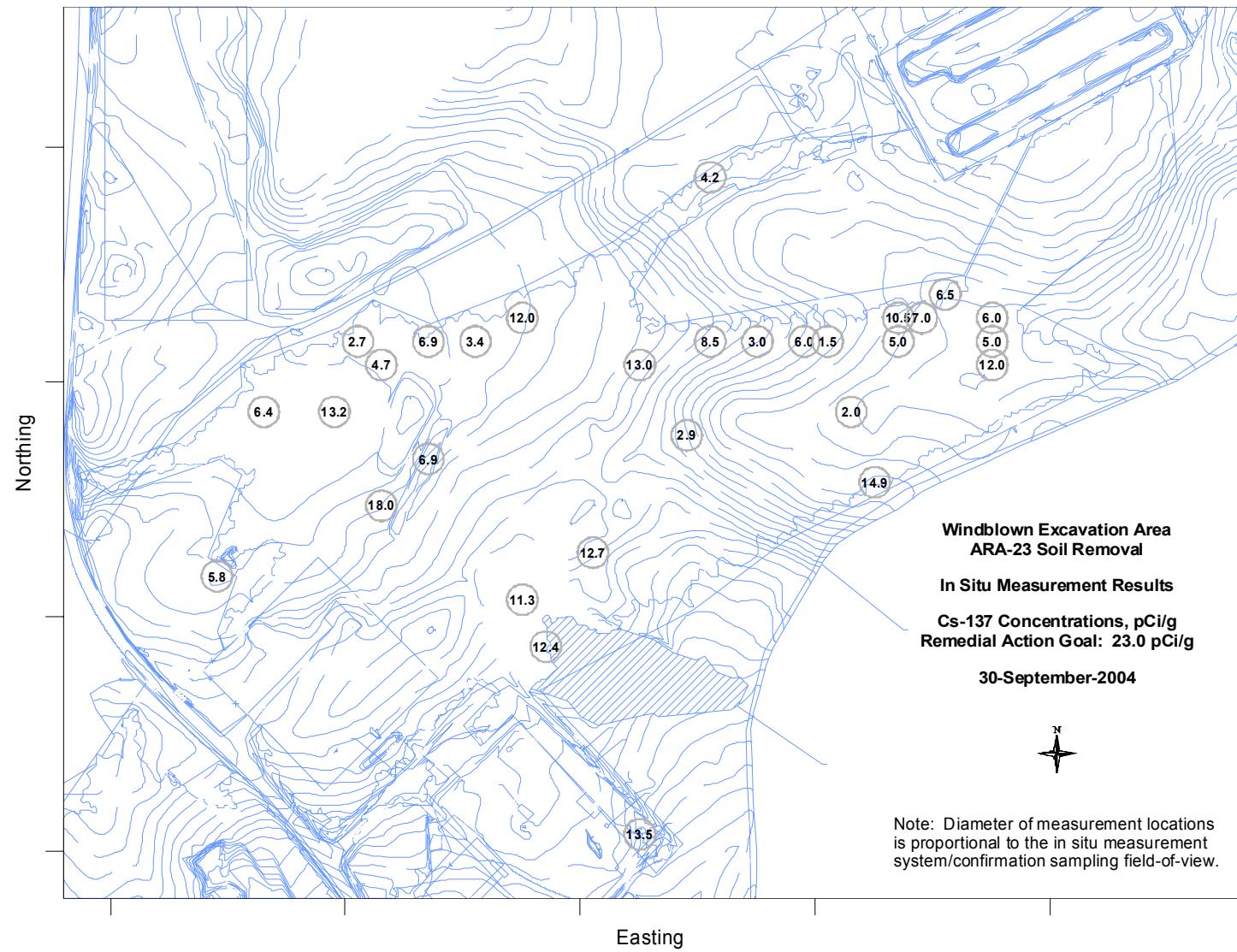


Figure H-12. Windblown area (ARA-23) Cs-137 in situ measurement results.

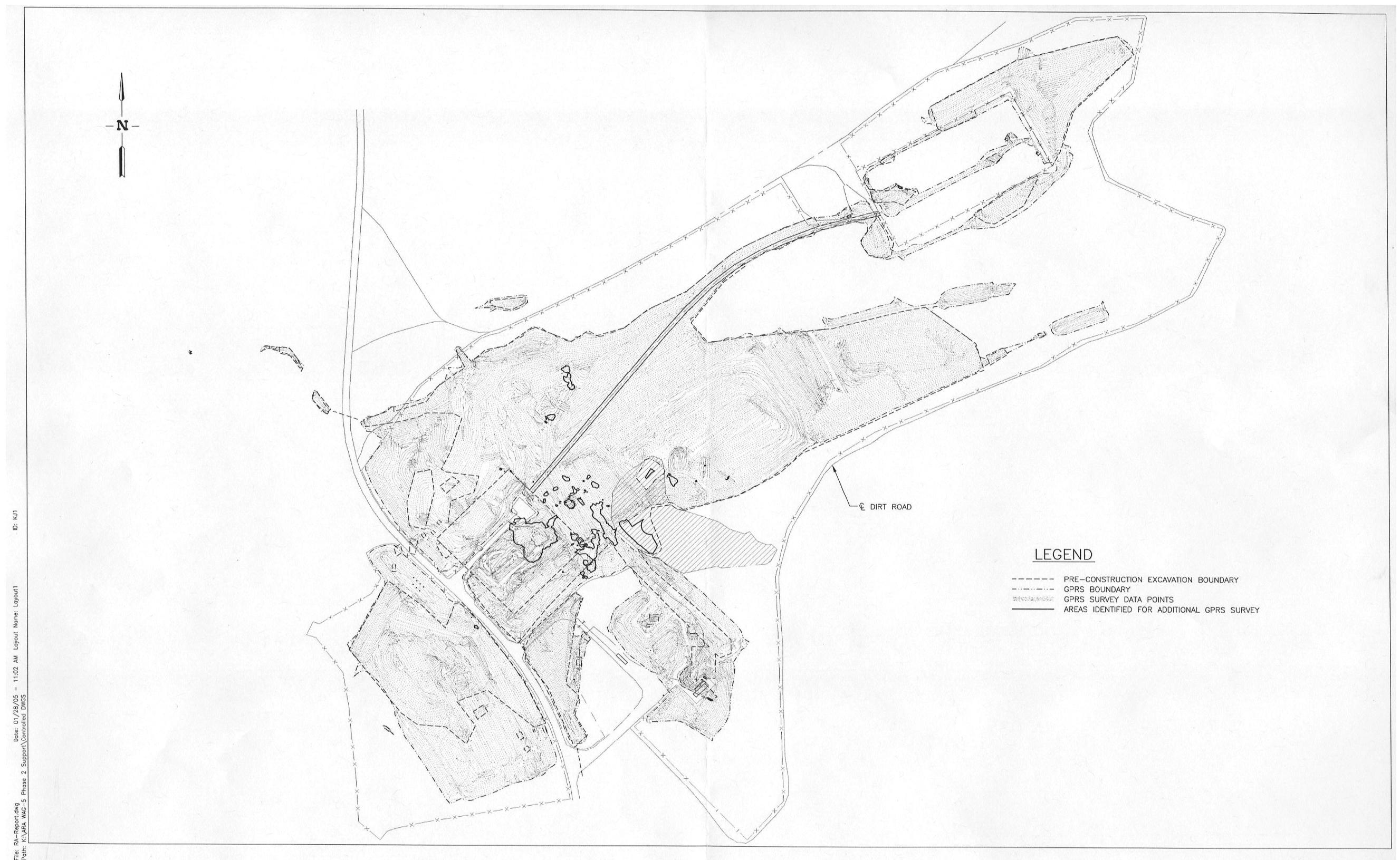


Figure H-13. Global Positioning Radiometric Scanner (GPRS) survey coverage map.